Project «Nature restoration in context post-war reconstruction of Ukraine»

The Department of Physical Geography of Lesya Ukrainka Volyn National University is implementing the project **«**Nature restoration in the context of post-war reconstruction of Ukraine**»**.

The project is coordinated by Vasyl Fesiuk, Doctor of Geography, Professor, Head of the Department of Physical Geography.

Project **objectives**:

1. To develop the concept of the place and role of nature restoration in the context of post-war reconstruction of Ukraine.
2. Development and justification of ways and measures for nature restoration.
3. Implementation of nature restoration cases at the national, regional and local levels.
4. Implementation of pilot nature restoration measures.
5. Creation of a database and website dedicated to nature restoration in the context of post-war reconstruction of Ukraine.

Description of the problem

he ecological state of Ukraine is under severe pressure from human activity, the scale of which exceeds the natural ability of ecosystems to recover. This creates a need for active restoration measures. Unfortunately, such measures are either absent or insufficient in scope to preserve biological diversity. The country lacks both legislative foundation for restoration work and a system for monitoring ecosystem restoration needs and methodology for their assessment. The situation has been complicated by military actions - by the end of 2023, over 8 million ha of agricultural land were mined, of which 6 million are in occupied territories and 2 million ha in liberated areas.

Regarding forest resources, Ukraine's forest cover is 15.9%. Scientists believe that the optimal indicator should be about 20%, which would require creating approximately 2.4 million hectares of new forest plantations. According to Global Forest Watch, forest cover losses from 2000-2023 amounted to 1.26 million hectares (11% of total forest area). The main threats to forest ecosystems are illegal logging, fires, and pests. The problem of self-seeded forests remains unresolved, though their preservation has important ecological significance and aligns with current global trends in environmental protection and climate change mitigation.

Ukraine leads Europe in the level of plowed land. Steppe territories have decreased to less than 3% of their original area. Steppe landscapes are heavily fragmented, divided into tens of thousands of plots, and are affected by climate change: meadow formation in the north and desertification in the south. The reduction in steppe ecosystem area has crossed the critical threshold necessary for natural regeneration and preservation of genetic diversity of steppe flora and fauna. The ecological structure of the remaining steppe ecosystems is so disturbed, and their area so small, that they have lost their ability to naturally spread to fallow lands. Instead, alien plant and animal species are appearing in steppe remnants. The main threats to steppe territories are plowing, recreational pressure, and afforestation.

Ukraine's water resources are in unsatisfactory ecological condition due to pollution, excessive water consumption, and climate change. In certain years, there is almost complete drying up of small and even medium-sized rivers and lakes, while the flow volume of large rivers decreases to levels that make normal functioning of their hydroecosystems impossible. There are serious problems with the functioning of the Dnipro cascade reservoirs and on the Siverskyi Donets and Dniester rivers. Illegal extraction of minerals (sand, amber) leads to changes in river channels and the hydrological network of certain territories. A significant problem remains the consequences of ineffective drainage melioration

in Polissia, which fundamentally changed the hydrological regime of previously waterlogged territories. Eutrophication transforms some water bodies in summer into polluted reservoirs with an unpleasant odor, covered with a layer of algae, leading to mass fish deaths.

Wetlands and peatlands have undergone substantial changes due to drainage, peat extraction, and agricultural use. A significant portion of peatlands was drained for agricultural needs, causing ecosystem degradation and increased greenhouse gas emissions. Drained peatlands have become vulnerable to fires, especially during dry periods. Changes in the hydrological regime have led to the disappearance of many wetland flora and fauna species. In Ukraine, the area of drainage systems is 3.31 million hectares. Currently, there is no clear understanding of which portion of these systems should continue to be operated and which should be returned to their natural state.

Coastal and marine ecosystems are under significant anthropogenic pressure and require restoration. The main problems are coastal water pollution from industrial effluents, agricultural fertilizers, and household waste, excessive nutrient input leading to eutrophication, and biotope degradation. The situation is worsened by overfishing and the spread of alien species that disrupt natural ecosystems. The destruction of the Kakhovka HPP became the largest man-made disaster. The Ministry of Environmental Protection has recorded over 3,000 cases of environmental damage amounting to more than 3 billion hryvnias.

Ukraine's soils have undergone significant degradation. During the period of intensive agricultural use, 30% of organic matter has been lost, almost all arable soils are compacted in the subsurface layer, nutrient content is decreasing, and there is a complex of problems on reclaimed lands. Over the past 20 years, humus losses are estimated at 0.4-0.8 tons per hectare, which on a national scale leads to losses of 453.4 billion hryvnias. Loss of humus and nutrients has been recorded on 43% of arable lands, compaction on 39%, silting and crust formation on 38%, water erosion on 17%, acidification and waterlogging on 14%, radioactive contamination and wind erosion on 11%, pesticide contamination on 9.3%, heavy metal contamination on 8%, salinization and alkalinization on 4.1%, and gully formation on 3%. In Ukraine, about 0.6 million hectares of soil require conservation, including 286,800 hectares of degraded land, 275,200 hectares of low-productive land, and 36,600 hectares of technogenically contaminated land, 142,800 hectares of disturbed land require reclamation, and 242,900 hectares of low-productive land need improvement.

Urbanization in Ukraine has led to the degradation of natural ecosystems in cities, with cultural landscapes sometimes forming that have completely lost connection with natural ones. The area of green zones and territories with natural biodiversity in cities is decreasing due to active construction and other types of use. Urban landscape restoration is becoming increasingly important for improving quality of life and ecological sustainability. A particular threat is the rapid increase in the number of vehicles in cities, which are the main source of air pollution.

The main current trends in Ukraine's environmental state are characterized by: accelerating rates of biodiversity loss, especially due to the impact of military actions on the environment; increasing areas of degraded land due to excessive plowing and agricultural use, urban development, and mining operations; and intensifying climate change impacts, manifested in rising global temperatures, water scarcity, formation of "heat islands," and increased frequency of extreme weather events.

The **results** of the project will be:

1. The concept of nature restoration in the context of post-war reconstruction of Ukraine will be developed.
2. Development of guidelines on best practices for the application of ways and measures of nature restoration.

3. Preparation of a monograph on the current state and problems of nature restoration in Ukraine.
4. Research on best practices of nature restoration at the national, regional and local levels.
5. Participation in the implementation of pilot nature restoration measures. Advisory support, scientific support.
6. Holding a scientific and practical conference on nature restoration in the context of post-war reconstruction of Ukraine.
7. Conducting master classes and workshops to present the best practices of restoration to the territorial communities of Ukraine.
8. Internships for teachers and students of Lesya Ukrainka Volyn National University to improve their skills in nature restoration.
9. Preparation of an online resource (geoportal) on nature restoration in the context of post-war recovery of Ukraine.